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EXAMINER	
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2878	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/925,059	ZHANG, EVAN Y.W.	
	Examiner	Art Unit	
	Shun Lee	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *4-6,9,10,14-16,28-33 and 37-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *4-6,9,10,14-16,28-33 and 37-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 August 2001 and 24 February 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 30 July 2004 has been entered.

Drawings

2. The drawings were received on 24 February 2004. These drawings are not acceptable since any changes to an application drawing must be in compliance with 37 CFR 1.84 and must be submitted on a replacement sheet of drawings which shall be an attachment to the amendment document and, in the header, labeled "Replacement Sheet".

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

4. Claims 6, 9, 14, 29, 30, and 41-43 are objected to because of the following informalities:

(a) in claim 6, "said device" on line 7 should probably be --said infrared and visible image fusion device-- (so as to avoid confusion with "display device");

(b) in claim 9, "said device" on line 2 should probably be --said infrared and visible image fusion device-- (so as to avoid confusion with "display device");

(c) in claim 14, "said device" on line 4 should probably be --said infrared and visible image fusion device-- (so as to avoid confusion with "display device");

(d) in claim 29, "said device" on line 6 should probably be --said infrared and visible image fusion device-- (so as to avoid confusion with "display device");

(e) in claim 30, "said device" on line 3 should probably be --said infrared and visible image fusion device-- (so as to avoid confusion with "display device");

(f) in claim 41, "at least a portion of" on line 11 should probably be deleted (see "filtered into a first spectral range" on line 5);

(g) in claim 41, "at least a portion of" on line 13 should probably be deleted (see "filtered into a second spectral range" on line 8);

(h) in claim 41, "at least a portion of said first" on line 16 should probably be --said first-- (see "filtered into a first spectral range" on line 5);

(i) in claim 41, "at least a portion of said second" on line 16 should probably be --said second-- (see "filtered into a second spectral range" on line 8);

(j) in claim 42, "a said" on line 9 should probably be --a--;

(k) in claim 43, "sa d NIR and LWIR spectral ranges" on line 17 should probably be --said first and second spectral ranges--;

(l) in claim 43, "said NIR spectral range" on lines 19-20 should probably be --said first spectral ranges--;

(m) in claim 43, "said LWIR spectral range" on lines 22-23 should probably be --said second spectral ranges--; and

(n) in claim 43, "visible and infrared images" on line 28 should probably be --first spectral range images--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 43 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification discloses (pg. 16, lines 21-29) that "The use of lenses 115, 117, 123, and 127 allow for optically correcting aberrations and scaling images so that correct overlap of images can be achieved. Because the NIR and LWIR signals are processed independently through lenses 115 and 117 respectively, different materials can be used to correct aberrations within the limited bandwidths. That is, instead of attempting to correct aberrations across the entire 0.48 to 12 μ waveband, only the

aberrations in the 0.48μ to 0.9μ waveband are corrected for the NIR sensor 116, and only aberrations in the 8μ to 12μ waveband are corrected for the LWIR sensor 118. This increases flexibility in selecting suitable materials and correcting aberrations".

However, claim 43 recites the limitation said composite objective lens is configured to introduce optical aberrations with said NIR and LWIR spectral ranges which was not described in the specification.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 16, 31, 32, and 42 are rejected under 35 U.S.C. 102(e) as being anticipated by Wolff *et al.* (US 6,781,127).

The specification (pg. 1) describes the visible (VIS) band as ~0.4 μm to ~0.76 μm, the near infrared (NIR) band as ~0.76 μm to ~1.1 μm, the short wave infrared (SWIR) band as ~1.1 μm to ~3 μm, the medium wave infrared (MWIR) band as ~3 μm to ~7 μm, and the long wave infrared (LWIR) band as ~7 μm to ~18 μm.

In regard to claim **42**, Wolff *et al.* disclose (Figs. 1 and 2) an infrared and visible image fusion device comprising a display device (70) and a camera (10, 20, 30, 40, 50),

said camera comprising an aperture (10), first (30) and second (40) sensors, a beam splitter (20), and electronic image fusion circuitry (50), wherein:

(a) said aperture (10) is arranged to allow radiation to enter said camera (10, 20, 30, 40, 50) and defines an aperture common (column 3, lines 14-21) to said beam splitter (20) and said first (30) and second (40) sensors;

(b) said beam splitter (20) is arranged to receive radiation passed through said aperture (10), said beam splitter (20) having a first waveband filter arranged to pass visible radiation in a first spectral range to said first sensor, and a second waveband filter arranged to pass infrared radiation in said second spectral range (*i.e.*, 3-15 μm comprising LWIR) to said second sensor;

(c) said first sensor (30) has a first output, said first output representing an image of said radiation passing through said aperture (10) filtered into said first spectral range;

(d) said second sensor (40) has a second output, said second output representing an image of said radiation passing through said aperture (10) filtered into a said second spectral range; and

(e) said electronic image fusion circuitry (50) is configured (column 6, line 26 to column 7, line 7) to process said first output representing said first spectral range and said second output representing said second spectral range by converting respective visible and infrared images represented by said first and second outputs to a consistent pixel and size format such that pixel-by-pixel data fusion is realized at said display device (70).

In regard to claim **16** which is dependent on claim 42, Wolff *et al.* also disclose (column 6, line 26 to column 7, line 7) that said display device is capable of selectively displaying said first output, said second output, or a fused image from said first and second outputs, wherein said fused image comprises at least a portion of said first output with at least a portion of said second output.

In regard to claim **31** which is dependent on claim 42, Wolff *et al.* also disclose (column 7, lines 8-30) processing circuitry arranged to implement image processing and automatic target recognition.

In regard to claim **32** which is dependent on claim 42, Wolff *et al.* also disclose (column 6, line 26 to column 7, line 7) a switch arranged to alternatively display said first and second outputs.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff *et al.* (US 6,781,127) in view of Menke (US 3,379,830).

In regard to claim **5** which is dependent on claim 42, the device of Wolff *et al.* lacks that the common objective lens comprises a first concave mirror arranged to reflect radiation entering the aperture, a reflective surface arranged to redirect said radiation reflected off said common objective lens toward said beam splitter. However,

optics (such as objective lenses, beam splitters, and waveband filters) for night vision technology are well known in the art. For example, Menke teaches (Fig. 2) a common objective lens (16) comprising a first concave mirror arranged to reflect radiation entering an aperture in order to observe images having different spectral ranges. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a first concave mirror in the device of Wolff *et al.*, in order to observe images having different spectral ranges.

11. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff *et al.* (US 6,781,127) in view of Hanson *et al.* (US 5,497,266).

In regard to claim **33** which is dependent on claim 42, the device of Wolff *et al.* lacks that said first and second outputs are arranged such that when a user opens the left eye while holding the right eye closed, the first output may be seen, when said user opens the right eye while holding the left eye closed, the second output may be seen, and when both the left and right eyes are open, said user may see both said first and second outputs overlapped. However, helmet mounted displays are well known in the art. For example, Hanson *et al.* teach (Fig. 9) a different display (video display 88 and night vision equipment 100) for each eye of a user in order to provide a different view for each eye (column 7, line 52 to column 8, line 26). It should be noted that it is inherent that an eye can only see when the eye is open. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a different display for each eye of an operator in the device of Wolff *et al.*, in order for each eye to see a different view.

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff *et al.* (US 6,781,127) in view of Gross *et al.* (US 6,075,661).

In regard to claim **14** which is dependent on claim 42, the device of Wolff *et al.* lacks an interconnect assembly comprising: a first connector arranged to releasably secure said device to a headgear; and a second connector arranged to releasably secure a power assembly arranged serving as a balancing weight to said headgear. However, helmet mounted goggles are well known in the art. For example, Gross *et al.* teach (column 2, line 55 to column 3, line 28; Fig. 1) an infrared imaging device (16) releasably secured to the front of headgear (26) and coupled by at least one interconnecting cable (14) to a power assembly (12) releasably secured to the back of headgear (26). Since the infrared imaging device and power assembly are symmetrically located about the headgear, they serve as balancing weights to each other. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a known interconnect assembly in the device of Wolff *et al.*, in order to releasably secure the infrared imaging device and the interconnected power assembly.

13. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff *et al.* (US 6,781,127) in view of Ansley *et al.* (US 5,726,671).

In regard to claim **15** which is dependent on claim 42, the device of Wolff *et al.* lacks that said display device comprises a viewing device mounted to a headgear such that, when said headgear is worn by an operator, said viewing device is positioned just above the eyes of an operator, and said viewing device may be viewed by said operator by looking upwards towards said viewing device. However, helmet mounted displays

are well known in the art. For example, Ansley *et al.* teach (column 4, lines 21-27; Fig. 4) a viewing device positioned just above the eyes of an operator in order to provide a high resolution display (column 1, lines 11-22). Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a viewing device is positioned just above the eyes of an operator in the device of Wolff *et al.*, in order to obtain a high resolution display.

14. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff *et al.* (US 6,781,127) in view of Nettleton *et al.* (US 5,336,899).

In regard to claim **28** which is dependent on claim 42, the device of Wolff *et al.* lacks a laser illuminator mounted to said camera for NIR illumination. However, night vision goggles are well known in the art. For example, Nettleton *et al.* teach (column 1, lines 12-40; column 2, line 64 to column 3, line 2) a laser illuminator for NIR illumination to enhance viewing with night vision goggles. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a NIR laser illuminator in the device of Wolff *et al.*, in order to enhance night vision viewing.

15. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff *et al.* (US 6,781,127) in view of Jungkman *et al.* (US 4,488,414).

In regard to claim **29** which is dependent on claim 42, the device of Wolff *et al.* lacks a waterproof and fireproof envelope sealing said camera and said display device; and at least one foam cut inserted between said envelope and said camera, said at least one foam cut arranged to protect said infrared imaging device against vibration, impact, and hot/cold weather. However, foam envelopes for night vision devices are

well known in the art. For example, Jungkman *et al.* teach (column 1, lines 12-40; column 2, line 47 to column 3, line 48) to provide foam envelopes for night vision devices (*e.g.*, infrared binoculars). Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a waterproof and fireproof envelope at least one foam cut in the device of Wolff *et al.*, in order to obtain a portable night vision device that can withstand high shock environments.

16. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff *et al.* (US 6,781,127) in view of Mammone (US 4,949,378).

In regard to claim **30** which is dependent on claim 42, the device of Wolff *et al.* lacks a voice activated switch arranged to selectively control said device. However, voice activated switches are well known in the art. For example, Mammone teaches (column 4, lines 60-64) that voice activated switches are obvious equivalents for manual switches. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a voice activated switch in the device of Wolff *et al.*, in order to selectively control said infrared imaging device.

17. Claims 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff *et al.* (US 6,781,127) in view of Chambers (US 4,720,871).

In regard to claims **37-40** which are dependent on claim 42, the device of Wolff *et al.* lacks an explicit description of circuitry configured to perform pixel-by-pixel addition, subtraction, convolution, and image enhancement. However, image processing circuitry are well known in the art. For example, Chambers teaches (column 1, line 13 to column 3, line 30) that image processing circuitry are used to perform pixel-

by-pixel addition, subtraction, convolution, and image enhancement to facilitate interpretation and analysis. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide circuitry configured to perform pixel-by-pixel addition, subtraction, convolution, and image enhancement in the device of Wolff *et al.*, in order to facilitate image interpretation and analysis.

18. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff *et al.* (US 6,781,127) and Chipper (US 6,292,293).

In regard to claim **41**, Wolff *et al.* is applied as in claim 42 above. The modified device of Wolff *et al.* lacks a description of an objective lens common to said first and second sensors between said aperture and said beam splitter, wherein said common objective lens is arranged to allow radiation in at least a portion of said first spectral range and at least a portion of said second spectral range to pass there through and comprises a composite lens free of crystal germanium and comprising elements ZnSe-$Ge_{33}As_{12}Se_{55}$-ZnSe. However, optics (such as lens) for night vision technology are well known in the art. For example, Chipper teaches (column 7, line 53 to column 8, line 40; Table 2) infrared material such as ZnSe and AMTIR-1 (*i.e.*, $Ge_{33}As_{12}Se_{55}$) are suitable for wide angle infrared lenses. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide wide angle infrared lenses (*e.g.*, ZnSe-$Ge_{33}As_{12}Se_{55}$-ZnSe) in the modified device of Wolff *et al.* for wide angle applications.

19. Claims 6, 16, 31, 32, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Yona *et al.* (US 6,195,206).

In regard to claim **42**, Horn discloses (Fig. 1) an infrared and visible image fusion device comprising a display device (15) and a camera (10, 11), said camera comprising:

(a) an aperture (*i.e.*, optics 10) arranged to allow radiation to enter said camera (10, 11);

(b) a first sensor having a first output, said first output representing an image of said radiation passing through said aperture (10) filtered into a first spectral range, wherein at least a portion of said first spectral range includes visible light and/or NIR (*e.g.*, 0.6 to 0.9 μm and 1.0-2.0 μm; column 2, lines 10-17);

(c) a second sensor (*e.g.*, LWS; column 2, lines 35-67) having a second output, said second output representing an image of said radiation passing through said aperture (10) filtered into a second spectral range, wherein at least a portion of said second spectral range includes infrared radiation (*e.g.*, 8-12 μm in the LWIR band; column 2, lines 35-67); and

(d) electronic image fusion circuitry (13, 14) configured to process said first output representing said first spectral range and said second output representing said second spectral range (column 1, line 54 to column 2, line 17; column 3, lines 1-10 and 49-51) to provide output signals to said display device (15).

While Horn also discloses (column 1, line 54 to column 2, line 17) that the radiation input of a view scene is collimated onto at least two focal plane arrays and that the data from the focal plane arrays are processed by readout circuits which utilize fusion algorithms to provide output signals to a flat panel display (column 3, lines 44-47), the device of Horn lacks an explicit description of a beam splitter arranged to receive

radiation passed through said aperture and having a first waveband filter arranged to pass radiation in said first spectral range to said first sensor and a second waveband filter arranged to pass radiation in said second spectral range to said second sensor and that the fusion algorithms comprise converting the first and second outputs to a consistent pixel and size format. However, optics (such as objective lenses, beam splitters, and waveband filters) for night vision technology are well known in the art. For example, Fergason teaches (column 1, line 34 to column 2, line 64; column 7, lines 10-30) a conjugate path (*i.e.*, a common optical axis) on which beam splitters, waveband filters, display devices (*i.e.*, projector) are arranged to selectively direct images having different spectral ranges so as to overlap and display substantially parallax-free images. Further, Yona *et al.* teach (column 3, lines 9-58; column 15, line 49 to column 16, line 26) that signal processing combines two measured images pixel by pixel into one digital image, which is then displayed on a display. Therefore it would be obvious to one of ordinary skill at the time of the invention to arrange apertures, beam splitters, waveband filters, and the display device along a common optical axis in the device of Horn, in order to measure substantially parallax-free overlapped images which are then processed by readout circuits which utilize fusion algorithms (*e.g.*, by converting the first and second outputs to a consistent pixel and size format for pixel by pixel combination) so as to provide a fused image output signal to a flat panel display.

In regard to claim **6** which is dependent on claim 42, the device of Horn lacks a beam combiner arranged to optically combine said first output comprising a first optical image and second output comprising a second optical image into a third output and an

optical viewer arranged to provide said first output, said second output, or said third output. However, optics (such as beam combiners) for night vision technology are well known in the art. For example, Fergason teaches (column 1, line 34 to column 2, line 64; column 7, lines 10-30) a conjugate path (*i.e.*, a common optical axis) on which beam combiners (*i.e.*, beam splitters) and waveband filters are arranged to selectively direct images having different spectral ranges so as to overlap and display substantially parallax-free images. Therefore it would be obvious to one of ordinary skill to provide a beam combiner in the device of Horn, in order to display substantially parallax-free overlapped images.

In regard to claim **16** which is dependent on claim 42, Horn also discloses (column 1, line 54 to column 2, line 17) that said display device is capable of selectively displaying said first output, said second output, or a fused image from said first and second outputs, wherein said fused image comprises at least a portion of said first output with at least a portion of said second output.

In regard to claim **31** which is dependent on claim 42, Horn also discloses (column 3, lines 1-10 and 49-51) processing circuitry arranged to implement image processing and automatic target recognition (*i.e.*, ATR).

In regard to claim **32** which is dependent on claim 42, the device of Horn lacks an explicit description of a switch arranged to alternatively display said first and second outputs. However, Horn also discloses (Fig. 1) a control panel (16). Therefore it would be obvious to one of ordinary skill at the time of the invention that the control panel (16)

in the device of Horn comprises a switch arranged to alternatively display said first and second outputs, in order to selectively view first and second outputs.

20. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Yona *et al.* (US 6,195,206) as applied to claim 42 above, and further in view of Owen (US 5,497,266).

In regard to claim **4** which is dependent on claim 42, while Horn also discloses (column 1, line 54 to column 2, line 17) that the radiation input of a view scene is collimated onto at least two focal plane arrays, the modified device of Horn lacks an explicit description of first and second objective lenses (*e.g.*, identical optics) between said beam splitter and said first and second sensor respectively. However, optics (such as objective lenses, beam splitters, and waveband filters) for night vision technology are well known in the art. For example, Owen teaches (column 6, line 60 to column 7, line 10) to provide an objective lens for a sensor in order to flatten the image field. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide objective lenses for the sensors in the modified device of Horn, in order flatten the image field.

21. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Yona *et al.* (US 6,195,206) as applied to claim 42 above, and further in view of Menke (US 3,379,830).

In regard to claim **5** which is dependent on claim 42, while Horn also discloses (column 1, line 54 to column 2, line 17) that the radiation input of a view scene is collimated onto at least two focal plane arrays, the modified device of Horn lacks an

explicit description of a common objective lens comprising a first concave mirror arranged to reflect radiation entering the aperture, a reflective surface arranged to redirect said radiation reflected off said common objective lens toward said beam splitter. However, optics (such as objective lenses, beam splitters, and waveband filters) for night vision technology are well known in the art. For example, Menke teaches (Fig. 2) a common objective lens (16) comprising a first concave mirror arranged to reflect radiation entering an aperture in order to observe images having different spectral ranges. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a first concave mirror in the modified device of Horn, in order to display substantially parallax-free overlapped images.

22. Claims 9, 10, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Yona *et al.* (US 6,195,206) as applied to claims 6 and 42 above, and further in view of Hanson *et al.* (US 5,497,266).

In regard to claims **9** and **10** which are dependent on claim 6, while Horn also discloses (column 3, lines 47-49) that the goggle subsystem is helmet mounted, the modified device of Horn lacks an explicit description that said optical viewer aligns with the eye of an operator and repositionable away from the eye of said operator. However, helmet mounted goggles are well known in the art. For example, Hanson *et al.* teach (column 2, lines 5-18) that said optical viewer (*i.e.*, video display) aligns with the eye of an operator and repositionable away from the eye of said operator. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a repositionable

goggle subsystem in the modified device of Horn, in order to stow the goggles out of the operator's line of sight when the goggles are not in use.

In regard to claim **33** which is dependent on claim 42, the modified device of Horn lacks that said first and second outputs are arranged such that when a user opens the left eye while holding the right eye closed, the first output may be seen, when said user opens the right eye while holding the left eye closed, the second output may be seen, and when both the left and right eyes are open, said user may see both said first and second outputs overlapped. However, helmet mounted displays are well known in the art. For example, Hanson *et al.* teach (Fig. 9) a different display (video display 88 and night vision equipment 100) for each eye of a user in order to provide a different view for each eye (column 7, line 52 to column 8, line 26). It should be noted that it is inherent that an eye can only see when the eye is open. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a different display for each eye of an operator in the modified device of Horn, in order for each eye to see a different view.

23. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Yona *et al.* (US 6,195,206) as applied to claim 42 above, and further in view of Gross *et al.* (US 6,075,661).

In regard to claim **14** which is dependent on claim 42, the modified device of Horn lacks an explicit description of an interconnect assembly comprising: a first connector arranged to releasably secure said device to a headgear; and a second connector arranged to releasably secure a power assembly arranged serving as a

balancing weight to said headgear. However, helmet mounted goggles are well known in the art. For example, Gross *et al.* teach (column 2, line 55 to column 3, line 28; Fig. 1) an infrared imaging device (16) releasably secured to the front of headgear (26) and coupled by at least one interconnecting cable (14) to a power assembly (12) releasably secured to the back of headgear (26). Since the infrared imaging device and power assembly are symmetrically located about the headgear, they serve as balancing weights to each other. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a known interconnect assembly in the modified device of Horn, in order to releasably secure the infrared imaging device and the interconnected power assembly.

24. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Yona *et al.* (US 6,195,206) as applied to claim 42 above, and further in view of Ansley *et al.* (US 5,726,671).

In regard to claim **15** which is dependent on claim 42, the modified device of Horn lacks that said display device comprises a viewing device mounted to a headgear such that, when said headgear is worn by an operator, said viewing device is positioned just above the eyes of an operator, and said viewing device may be viewed by said operator by looking upwards towards said viewing device. However, helmet mounted displays are well known in the art. For example, Ansley *et al.* teach (column 4, lines 21-27; Fig. 4) a viewing device positioned just above the eyes of an operator in order to provide a high resolution display (column 1, lines 11-22). Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a viewing device is

positioned just above the eyes of an operator in the modified device of Horn, in order to obtain a high resolution display.

25. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Yona *et al.* (US 6,195,206) as applied to claim 42 above, and further in view of Nettleton *et al.* (US 5,336,899).

In regard to claim **28** which is dependent on claim 42, the modified device of Horn lacks a laser illuminator mounted to said camera for NIR illumination. However, night vision goggles are well known in the art. For example, Nettleton *et al.* teach (column 1, lines 12-40; column 2, line 64 to column 3, line 2) a laser illuminator for NIR illumination to enhance viewing with night vision goggles. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a NIR laser illuminator in the modified device of Horn, in order to enhance night vision viewing.

26. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Yona *et al.* (US 6,195,206) as applied to claim 42 above, and further in view of Jungkman *et al.* (US 4,488,414).

In regard to claim **29** which is dependent on claim 42, the modified device of Horn lacks a waterproof and fireproof envelope sealing said camera and said display device; and at least one foam cut inserted between said envelope and said camera, said at least one foam cut arranged to protect said infrared imaging device against vibration, impact, and hot/cold weather. However, foam envelopes for night vision devices are well known in the art. For example, Jungkman *et al.* teach (column 1, lines 12-40; column 2, line 47 to column 3, line 48) to provide foam envelopes for night vision

devices (*e.g.*, infrared binoculars). Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a waterproof and fireproof envelope at least one foam cut in the modified device of Horn, in order to obtain a portable night vision device that can withstand high shock environments.

27. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Yona *et al.* (US 6,195,206) as applied to claim 42 above, and further in view of Mammone (US 4,949,378).

In regard to claim **30** which is dependent on claim 42, while Horn also discloses (Fig. 1) a control panel (16), the modified device of Horn lacks a voice activated switch arranged to selectively control said device. However, voice activated switches are well known in the art. For example, Mammone teaches (column 4, lines 60-64) that voice activated switches are obvious equivalents for manual switches. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide a voice activated switch in the modified device of Horn, in order to selectively control said infrared imaging device.

28. Claims 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Yona *et al.* (US 6,195,206) as applied to claim 42 above, and further in view of Chambers (US 4,720,871).

In regard to claims **37-40** which are dependent on claim 42, while Horn also discloses (column 2, lines 3-17; column 3, lines 1-10 and 49-51) circuitry configured to process and enhance images which are fused for display, the modified device of Horn

lacks an explicit description of circuitry configured to perform pixel-by-pixel addition, subtraction, convolution, and image enhancement. However, image processing circuitry are well known in the art. For example, Chambers teaches (column 1, line 13 to column 3, line 30) that image processing circuitry are used to perform pixel-by-pixel addition, subtraction, convolution, and image enhancement to facilitate interpretation and analysis. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide circuitry configured to perform pixel-by-pixel addition, subtraction, convolution, and image enhancement in the modified device of Horn, in order to facilitate image interpretation and analysis.

29. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009) and Chipper (US 6,292,293).

In regard to claim **41**, Horn in view of Fergason is applied as in claim 42 above. While Horn also discloses (column 2, lines 33-34) that the aperture (*i.e.*, optics 10) process input radiation that is collimated onto a sensor subassembly (11), the modified device of Horn lacks a description of an objective lens common to said first and second sensors between said aperture and said beam splitter, wherein said common objective lens is arranged to allow radiation in at least a portion of said first spectral range and at least a portion of said second spectral range to pass there through and comprises a composite lens free of crystal germanium and comprising elements ZnSe-$Ge_{33}As_{12}Se_{55}$-ZnSe. However, optics (such as lens) for night vision technology are well known in the art. For example, Chipper teaches (column 7, line 53 to column 8, line 40; Table 2) infrared material such as ZnSe and AMTIR-1 (*i.e.*, $Ge_{33}As_{12}Se_{55}$) are suitable for wide

angle infrared lenses. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide wide angle infrared lenses (*e.g.*, ZnSe-$Ge_{33}As_{12}Se_{55}$-ZnSe) in the modified device of Horn for wide angle applications.

30. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horn (US 6,335,526) in view of Fergason (US 6,379,009), Yona *et al.* (US 6,195,206), Chipper (US 6,292,293), and Owen (US 5,497,266).

In regard to claim **43**, Horn in view of Fergason and Yona *et al.* is applied as in claim 42 above and Chipper is applied as in claim 41 above. While Horn also discloses (column 2, lines 33-34) that the aperture (*i.e.*, optics 10) process input radiation that is collimated onto a sensor subassembly (11), the modified device of Horn lacks a first aberration correcting lens configured in said first optical channel to correct aberrations within said first spectral range and a second aberration correcting lens configured in said second optical channel to correct aberrations within said second spectral range. However, optics (such as aberration correcting lens) for night vision technology are well known in the art. For example, Owen teaches (column 6, line 60 to column 7, line 10) aberration correcting lenses in order to correct for aberrations. Therefore it would be obvious to one of ordinary skill at the time of the invention to provide aberration correcting lenses in the modified device of Horn, in order to correct for aberrations.

Response to Arguments

31. Applicant's arguments filed 30 July 2004 have been fully considered but they are not persuasive.

Applicant argues (remarks filed 30 July 2004) that the art previously cited against independent claim 36 fails to teach or suggest the conversion of the respective visible and infrared images taken through a common optical aperture to a consistent pixel and size format since the Yona *et al.* patent merely teaches that images taken from two separate images sources with separate optical apertures may be combined pixel by pixel to one digital image. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Yona *et al.* state (column 2, lines 12-15) that " ... eye 6 receives one superimposed image created from the rays 3A from image 5 and from the rays 3B from image 4" and (column 9, line 63 to column 10, line 4) that "Referring now to FIG. 11, the total image formed on the visor 202 includes a combination of three images. A first image, which includes the images of airplane 250, house 252, car 254, container 256 and road 258, is an image of the scenery. A second image, which includes circles 260 and 264 is the image detected by image intensifier 206. This image includes intensified details of objects of the first image, which are included therein. For example, the image intensifier 206 detects the image of car 254 and provides an image of it, which adds to the first image. In FIG. 11, this is represented by thickening the lines of objects in circles 260 and 264". Thus Yona *et al.* teach an output image combined pixel by pixel from separate input images sources wherein each separate input image provides different details of superimposed objects in the output image (see Fig. 11).

Inherent in output images with superimposed objects from combining pixel by pixel separate input images are that the separate images have a consistent pixel and size format (otherwise combining pixel by pixel will result in objects which are not superimposed). Therefore it would be obvious to one of ordinary skill at the time of the invention to arrange apertures, beam splitters, waveband filters, and the display device along a common optical axis in the device of Horn, in order to measure substantially parallax-free overlapped images which are then processed by readout circuits which utilize fusion algorithms (*e.g.*, by converting the first and second outputs to a consistent pixel and size format for pixel by pixel combination) so as to provide a fused image output signal with superimposed objects to a flat panel display.

Conclusion

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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